MEDIATED GENERALIZATION OF THE EFFECT OF REPRIMANDS ACROSS TWO TOPOGRAPHIES OF SELF-INJURY

Lana L. Kliethermes

Thesis Prepared for the Degree of

MASTER OF SCIENCE

UNIVERSITY OF NORTH TEXAS

May 2004

APPROVED:

Richard G. Smith, Major Professor and Chair of the Department of Behavior Analysis
Cloyd Hyten, Committee Member
Jesus Rosales-Ruiz, Committee Member
David W. Hartman, Dean of the School of Community Service
Sandra L. Terrell, Interim Dean of the Robert B. Toulouse School of Graduate Studies

Kliethermes, Lana L., *Mediated Generalization of the Effect of Reprimands Across Two Topographies of Self-Injury*. Master of Science (Behavior Analysis), May 2004, 50 pp., 2 figures, 2 tables, references, 57 titles.

This study sought to assess the effects of pairing a neutral stimulus with a reprimand contingent on occurrences of two topographies of problem behavior. Using a multiple baseline withdrawal with a nested multi-element design, contingencies were first applied to eye poking and, subsequently, to a second behavior, skin picking. In each case, the participant wore wristbands (a previously neutral stimulus) during treatment sessions. Results indicated that the reprimands were effective in decreasing both behaviors. In addition, when skin picking resulted in reprimands, eye poking also decreased. However, when reprimands were contingent on eye-poking, the effects did not appear to generalize to skin-picking. Some possible accounts for this asymmetrical pattern of generalization are discussed.

ACKNOWLEDGMENTS

I would like to express my sincerest gratitude to the all of those who helped and supported me in order to make this project possible. I would first like to express my sincere appreciation to Dr. Richard Smith for his dedication and time in supporting and guiding this project. I owe him a debt I could never repay. I want to thank Clinton Kliethermes for his many contributions to this project, including computer expertise, selfless support, and helping me set reachable goals. I would like to thank Scott McKenzie whose work inspired me, and the other BARC team members for the numerous contributions they have given to this project and my professional development during the time that I worked and learned with them. I would like to thank the University of North Texas Behavior Analysis department for providing me with the cornerstone on which to build my career. I would like to thank Dr. Jesus Rosales-Ruiz and Dr. Cloyd Hyten for serving as members of my committee, and the numerous contributions they have made to make this possible. Finally, I would also like to thank my parents John and Lois Kastern, as well as the all of my family and friends who have along the way encouraged me and challenged me to accomplish this and other career goals.

TABLE OF CONTENTS

CHAPTER I

INTRODUCTION

Self-injurious behavior (SIB) is a behavior disorder exhibited by individuals with mental retardation and other developmental disabilities. The estimated prevalence of this problem behavior among the population living in residential facilities is 5.3% to 37.1% of individuals (Singh, 1981). Hyman, Fisher, Mercugliano, & Cataldo (1990) summarized the characteristics of 97 children, adolescents, and young adults who engaged in SIB. A wide range of topographies, such as head banging, body hitting, eye-poking, self-injurious scratching, were observed in their participants. Hyman et al. (1990) also noted that it was common for individuals who engaged in SIB to exhibit multiple types of SIB. Of the 97 individuals in their study, 29.9% engaged in two topographies of self injurious behavior, 26.8% engaged in three, 13.4% engaged in four, and 11.3% engaged in five or more topographies of SIB. Self-scratching was observed in 23.7% of the participants,, and 19.6% of participants engaged in eye-poking. These two topographies of SIB can result in a variety of injuries such as corneal abrasions, cataracts, perforation of the eye, retinal detachment, scars, calluses, bruises, local infections, excoriations, and permanent loss of vision.

Research has shown that, for many individuals, SIB occurs as a function of environmental antecedents and consequences (Iwata, Dorsey, Slifer, Bauman, & Richman 1982/1994). For example, contingencies of social-positive reinforcement and negative reinforcement have been demonstrated to maintain SIB. In addition, Vaughan and Michael (1982) have argued that, many behaviors can be maintained by operant

contingencies that are not socially mediated. Vollmer (1994) explained that behavior disorders maintained by these types of contingencies, commonly referred to as automatic reinforcement, pose an interesting dilemma for three reasons. First, the specific form of the reinforcer often is unknown to the researcher, because the behavior produces its reinforcing consequences directly (without mediation by another person). The precise nature of the maintaining stimulation may be difficult to identify because it may be difficult or impossible to systematically manipulate hypothesized maintaining consequences (e.g., eye poking maintained by stimulation of the optic nerve). Secondly, the reinforcer is available as long as the person is capable of engaging in the response, because the maintaining consequence does not depend on the presence or involvement of other people, and because of the automatic relationship between the response and the consequence. Thus, there may be no situation in which the stimulus is not available as a consequence for the behavior. Finally (and relatedly), the researcher cannot control the reinforcer without manipulating access to the response, because the reinforcer automatically follows each instance of the response. For these reasons, SIB that is automatically maintained presents a unique challenge for clinicians and researchers.

Treatments to decrease automatically reinforced behaviors have been investigated within the literature. One type of treatment involves adding physical stimuli to the environment. Researchers have shown that enriching the participant's environment by adding toys or other objects that can be manipulated may decrease SIB, while at the same time increasing adaptive behavior (Horner, 1980). Furthermore,

providing participants with access to stimuli that were “matched” (i.e., thought to produce similar consequences to the targeted SIB) has been shown to be more effective in decreasing SIB than providing “unmatched” but highly preferred stimuli (Piazza, Adelinis, Hanley, Goh, & Delia, 2000). Additionally, enrichment effects lasted longer when sets of stimulus items were rotated, rather than when stimulus items drawn from the same set were presented for a longer duration (DeLeon, Anders, Rodriguez-Catter, & Neidert, 2000). The results of these studies suggest that access to objects and activities that provide forms of stimulation similar to those suspected to maintain SIB may alter the motivation to engage in SIB, perhaps by abolishing the reinforcing effectiveness of the maintaining consequences (Michael, 1993).

Another type of treatment for automatically reinforced SIB involves differential reinforcement procedures (e.g. differential reinforcement of the omission of target behaviors [DRO], differential reinforcement of alternative behaviors [DRA]). Horner (1980) observed decreases in SIB and increases in adaptive, object-directed behavior when the participant was provided with an enriched environment and differential reinforcement for engaging in adaptive behavior. Cowdery, Iwata, and Pace (1990) used DRO to decrease stereotypic, self-injurious scratching for up to 30 min. The therapist left the room and told the participant not to scratch until she came back. When she returned he received a token (penny) which he could later exchange for TV, snacks, video games, and other leisure materials if he had not scratched while the therapist was out of the room. Similarly, Wacker et al. (1990) used functional communication training (FCT) and DRO to treat stereotypic body rocking for one

participant. Access to a rocking chair and an exercise bicycle were provided contingent on a communicative response (FCT) and the absence of body rocking (DRO). Each component of the treatment was implemented separately following the training and results indicated that each was successful in decreasing body rocking.

A third type of intervention for automatically maintained problem behaviors is interruption or prevention of the target response. This treatment does not allow the behavior to contact the consequences that maintain SIB, resulting in what has been termed “sensory extinction.” Among the procedures that have been used to prevent access to the automatically produced consequences maintaining SIB are restraint, protective equipment (e.g., helmets, mitts), and response blocking (Dorsey, Iwata, Reid, & Davis, 1982; Reid, Parsons, Phillips, & Green, 1993; Lerman & Iwata, 1996; Lindberg, Iwata, & Kahng, 1999; Smith, Russo, & Le, 1999; McCord, Thompson, & Iwata 2001).

Finally, automatically maintained SIB has been treated using punishment procedures. Punishment involves the presentation of aversive stimulation contingent on the occurrence of behavior, resulting in a decrease in some measurable dimension of the behavior (Catania, 1998). Punishment is typically viewed as a “default” approach to treatment that is employed only after less intrusive procedures have been attempted and failed. However, it has been argued that it may be more frequently necessary to use punishment with automatically reinforced problem behaviors than with problem behaviors maintained socially (Vollmer, 1994), due to the difficulty in identifying, withholding, and providing alternative means of accessing controlling reinforcers. That

is, the challenges presented by automatically maintained problem behaviors frequently limit the effectiveness of reinforcement-based procedures (e.g., DRO), necessitating consideration of more intrusive interventions such as punishment.

Among the stimuli used as punishment are electrical stimulation (Linscheid, Iwata, Ricketts, Williams, & Griffin, 1990), water mist (Dorsey, Iwata, Ong, & McSween, 1980), loud tones (Flanagan, Goldiamond, & Azrin, 1958), aversive tastes (Watson, Dittmer, & Ray, 2000), spanks (Rekers & Lovass, 1974), slaps (Koegel & Covert, 1972), contingent effort (e.g., correction , overcorrection, and positive practice [Rasing, 1993; Foxx & Azrin, 1973; Carey & Bucher, 1983]), lemon juice (Sajwaj, Libet, & Agras, 1974), and verbal reprimands (Van Houten, Nau, Mackenzie-Keating, Sameoto, & Colavecchia, 1982). Reprimands have several potential advantages over other forms of punishment. Reprimands are easily delivered, generally acceptable to consumers and advocates, do not produce tissue damage or other enduring effects (as might occur with forceful contact [e.g., slaps]), and can specify the behavior being punished. Reprimands appear to derive their punishing effectiveness via pairings with other aversive stimuli. That is, reprimands are frequently delivered as adjuncts to other, more intrusive, forms of punishment (as when a parent spanks a child and simultaneously says “No! Bad boy!”). Thus, reprimands likely function as secondary, as opposed to primary aversive stimuli (Catania, 1998).

When using punishers it is common for effects of punishment to be specific to the setting or situation in which the punisher was delivered. That is, the effects of punishment may be limited to the context in which the punishers have been contingent

on problem behavior, failing to generalize to other environments. The development of procedures to transfer the effects of behavioral interventions (i.e., to produce generalization), has long been a concern for applied behavior analysis. However, given this long-standing emphasis, it is somewhat surprising that much applied work falls into the category referred to by Stokes and Baer (1977) as "train and hope" (e.g., Buffington, Krantz, McClannahan, & Poulson, 1998; Young, Krantz, McClannahan & Poulson, 1994; Singh & Millichamp, 1987; Cuvo, Leaf, & Borakove, 1978). That is, although transfer of treatment effects to other environments or behaviors may be desired, it is not frequently programmed. In fact, although train and hope techniques have often been characterized as probing for transfer without incorporating transfer as an explicit goal of training, much current research does not include attempts to assess transfer. Some researchers have more actively promoted transfer by seeking it as a byproduct of over-training or by following transfer probes with remedial training in the new setting, for example, if transfer was not found to have occurred spontaneously (Halle & Holt, 1991). Such methods are an improvement over train and hope, yet they do not represent a systematic approach to promoting transfer.

Nonetheless, several approaches to generalization can be seen in the literature. Generalization has been addressed in the literature in terms of either stimulus generalization or response generalization. Stimulus generalization occurs when behavior changes spread to different stimulus conditions, such as environments other than those where conditioning took place (Stokes & Baer, 1977), and response generalization refers to the spread of the effects of training or conditioning procedures to behaviors

other than those directly exposed to the conditioning procedures (Keller & Schoenfeld, 1950). Stokes and Baer (1977) have argued that generalization may not occur as a "natural" consequence of intervention, and so promotion of both forms of generalization (when appropriate) should not be an afterthought in training, nor should transfer be merely another dimension of the response to measure. Rather, transfer of training should be a primary goal of behavioral treatment; technologies that promote it should be an explicit component of behavioral programming. Furthermore, the occurrence of one form of generalization may occur independently of the other form, suggesting that each type of generalization should be assessed and programmed independently. For example, Kirby & Holborn (1986) showed that, after training gross motor skills in preschool children, the new skills were observed in other settings (i.e., stimulus generalization was observed), but no change was produced in other categories of behavior such as fine-motor skills or social behaviors (i.e., response generalization was not observed).

Several studies have investigated the necessity of and means to promote stimulus generalization of the effects of interventions. Intervention effects may often fail to transfer in the presence of novel therapists, stimulus materials, or settings. Lovaas, Koegel, and Schreibman (1979) point out that persons with developmental disabilities may be most likely to exhibit overselectivity, responding "to only part of a relevant cue, or even to a minor, often irrelevant feature of the environment" (p. 1237) across a variety of stimulus modalities (e.g., visual, auditory, and social stimuli). For example, children with autism, mental disabilities, and typical children were taught to

respond to a three-component stimulus containing visual, auditory, and tactile elements (Lovass, Schreibman, Koegel, & Rehm, 1971). Bar pressing was reinforced in the presence of the stimulus, and no reinforcement was delivered for responding in its absence. After training, the children were presented test trials, in which each component was presented separately. Typical children responded equally to each component, children with autism responded primarily to one component, and mentally disabled children responded to two components.

Overselectivity is most likely to be a problem when multiple cues and stimuli were not used in the training environment. Rincover and Koegel (1975) suggested that training students in multiple environments might be necessary to combat the effects of irrelevant cues, or at least to detect when the individual's responding is over-selective. A similar means of promoting generalization, termed "training with sufficient exemplars" (Stokes & Baer, 1977), may be more useful with developmentally disabled adults. Training using sufficient exemplars may be characterized as encouraging transfer of new skills by using multiple tutors, stimulus items, or even multiple behaviors during training. For example, if multiple tutors are used, the individual theoretically learns to respond to multiple persons delivering a task; transfer is trained from the start, so that the critical features of the training context are more likely to gain primary control of the response, rather than idiosyncratic and often unknown characteristics of a single trainer. However, training with sufficient exemplars has not been limited to training with multiple tutors. Haring (1985) demonstrated transfer after training across multiple

stimulus sets, and Marchand–Martella et al. (1992) trained first-aid skills across multiple trainers, multiple simulated injuries, and novel instructional cues.

In addition to the outcomes of training, stimulus generalization of punishment effects also has been investigated. Early researchers suggested that one way to encourage generalization of punishment effects is to apply the punisher in a variety of settings (Corte, Wolf, & Locke, 1971). However, logistical concerns, such as availability of personnel to apply procedures across contexts and behaviors, limit the viability of this strategy for many treatment providers.

More recently, procedures that reduce the need to punish in multiple environments have been attempted. By pairing a salient cue (e.g., a card or sticker) with punishment contingencies and then presenting that cue in targeted environments, it is possible to transfer the effects of punishment to other environments in which punishment has not been experienced (Piazza, Hanley, & Fisher, 1996; Maglieri, DeLeon, Rodrigez-Catter, & Sevin, 2000).

Piazza, Hanley, and Fisher (1996) implemented a stimulus control procedure in conjunction with a reprimand to reduce a participant's cigarette butt pica. At the beginning of each training session, the participant was given a set of instructions, specifying that he could not touch the cigarette butt, he could eat the food available to him, and to he was to engage in a prescribed activity. At the beginning of the session, he was handed a purple card. During these sessions, each attempt to engage in pica produced a reprimand from the therapist. The effects of training were observed during probe sessions in which the participant was given either a purple card or a yellow card

at the beginning of the session. During probe sessions, there were no formal consequences for pica. Results indicated that pica occurred at near zero levels in all environments in which the purple card was present.

Similarly, Maglieri, DeLeon, Rodrigez-Catter, and Sevin (2000) reduced covert food stealing in a participant diagnosed with moderate mental retardation and Prader-Willi Syndrome by using a stimulus control procedure in conjunction with a reprimand. A previously neutral stimulus, a sticker, was placed on a container with foods that could not be consumed. Each time the participant tried to eat a food item from the container with the sticker the participant was reprimanded. No reprimand was delivered for eating food items in a container without the sticker. Probes were conducted in different environments with novel foods. Results indicated that the participant no longer engaged in food stealing and did not eat foods from containers if the sticker was present.

McKenzie (2002) investigated a conceptually similar, but more portable, procedure to promote stimulus generalization. Two types of sessions were conducted in a therapy room. During one condition, the participant wore wristbands, and eye-poking produced reprimands. In a second condition, no wristbands were worn, and there were no consequences for eye-poking. Eye-poking decreased when the wristbands were worn but not when no wristbands were present. Subsequently, it was shown that eye-poking also decreased when the wristbands were worn in other environments such as the participant's home, workshop, and canteen, even though a no reprimand contingency was or had been in effect in those environments. Higher levels of eye-

poking were observed in those environments when the participant did not wear wristbands.

Response generalization, or the spread of the effects of training or conditioning procedures to other behaviors, also is of interest to applied behavior analysts. Response generalization can take several forms. For example, when one response is "strengthened," additional behaviors may be strengthened (probably to a lesser degree) without changing external stimuli. This type of interrelationship, or covariation, among behaviors (Voeltz & Evans, 1982) has been termed *correspondence*. For example, Ludwig and Geller (1991) showed that, when an intervention to increase safety belt use by pizza delivery drivers was put in place, an additional untargeted behavior, the use of turn signals, also increased 25% above baseline levels. Although using a turn signal was a different topography than wearing one's seat belt, the intervention that targeted seat belt use may have affected a more general category, such as "safe driving practices." In addition, changes may be seen across multiple dimensions of untargeted behaviors (e.g. force and duration) (Keller & Schoenfeld, 1950). For example, following an intervention to increase the frequency of seat belt wearing, both the frequency and duration of looking at a rear-view mirror might also increase.

Processes that decrease behaviors also can produce correspondent covariation. For example, Friman and Hove (1987) demonstrated that an aversive taste treatment, used to successfully decrease thumb sucking also eliminated hair pulling in one participant. In another study (Greene, Bailey, & Barber, 1981), middle school children on a bus were allowed to listen to "high appeal" music and participate in a raffle if they

had emitted less than a specified number of noisy outbursts above 500 Hz on the previous day. A light came on each time a noise louder than 500 Hz was emitted. Results indicated that participants not only engaged in fewer outbursts, but other non-targeted behaviors (rough-housing and getting out of seat) decreased as well.

Another way that behaviors can be interrelated (or can covary) is *inverse covariation*, such as when changes in one behavior produce changes in an opposite direction for another behavior. For example, Sprague and Horner (1992) showed that when a participant engaged in multiple problem behaviors and one member of a response class was blocked or verbally reprimanded, there was a collateral increase in one or more problem behaviors from the same response class. Similarly, Risley (1968) examined interrelationships among punished and unpunished behaviors, and found that, after using electric shock to eliminate the dangerous climbing on bookcases, a similar topography, climbing on the back of a chair, increased. Magee and Ellis (2000) conducted functional analyses to identify the reinforcement contingencies maintaining the multiple problem behaviors of two participants. Following this assessment, a baseline condition was conducted in which all problem behaviors produced the identified maintaining reinforcer. Subsequently, the investigators applied extinction contingencies sequentially for each participant, starting with the most frequently observed topography of problem behavior. Results showed that, for one participant, when out of seat behavior was placed on extinction, three behaviors that had not previously been observed (yelling, inappropriate language and gestures, and destruction) appeared. For the other participant, when a target behavior (object

mouthing) was placed on extinction, a behavior that had seldom been observed (destruction) increased. When destruction was placed on extinction, yet another problem behavior (aggression) emerged. Finally, Mace and Belfiore (1990) showed that when compliance to low probability requests (requests that seldom occasioned compliance) was increased by preceding those requests with a series of high probability requests (requests that frequently occasioned compliance), the participant engaged in decreased levels of stereotypic touching responses. These examples show that inverse covariation can result from a variety of operations, including punishment of selected members of a response class (Sprague & Horner 1992; Risley 1968), extinction of selected members of a response class (Magee & Ellis 2000), and by preceding low probability requests with a series of high probability requests (Mace & Belifore, 1990).

Interestingly, the Sprague and Horner study described above provided an example of correspondence *as well as* inverse correlation. Members of the class of problem behaviors *simultaneously decreased* when a participant was taught a positive alternative behavior or provided antecedent assistance, showing inverse covariation between the alternative behavior and the class of problem behavior and correspondence among the class of problem behaviors. In addition, it is important to recall that inverse covariation *within the class of problem behaviors* also was observed in this study (see above). Similarly, Shulka and Albin (1996) found that a class of problem behaviors could be reduced by training a functionally communicative response; however, when extinction was used in the absence of reinforcement for an alternative response, less severe problem behaviors decreased but more severe problem behaviors

increased. The outcomes of these studies suggest that patterns of covariation within and across response classes can be complex, and a function of specific environmental arrangements.

The purpose of the current study was twofold. The study examined the generalized effects of stimuli correlated with reprimands across two topographies of SIB. By systematically applying a reprimand contingency to each topography individually and pairing reprimands with a common stimulus (wristbands), it was possible to examine patterns of covariance across the two targeted topographies. In addition, we examined how long decreases in SIB would persist in the absence of a reprimand contingency but in the presence of the stimuli that had previously been correlated with a reprimand contingency.

CHAPTER II

METHOD

Participant

Diane was a 46 year-old female who lived at a state residential and training facility. She was diagnosed with profound mental retardation and had an IQ score of 10. Diane demonstrated basic self-help skills and will followed basic one-step instructions. Her SIB consisted of eye-poking and skin-picking. Medical reports indicated that Diane had engaged in eye-poking since she was a 6 years-old. Eye-poking had produced serious damage to Diane's eyes including permanent vision impairment and dislodging Diane's eye from the socket on several one occasions. A prior functional analysis had shown that Diane's eye-poking persisted in the absence of social consequences, indicating that it was maintained by its automatically-produced consequences. Skin-picking was first mentioned in Diane's records when she was 26 years-old. Skin-picking often resulted in open sores, and had produced permanent tissue damage and scarring. Although no prior functional analysis had been conducted for skin-picking, it also had been observed to persist in the absence of social consequences and was assumed to be maintained automatically.

Prior to the current study, Diane's treatments had included training an incompatible behavior (having Diane hold a towel or sock), redirection to other activities, wearing sport glasses to block the opportunity to respond (Diane simply changed the angle at which she poked her eyes), wearing long sleeved shirts and pants to increase the effort necessary to pick skin, noncontingent attention, personal and

mechanical restraints, response-blocking, and reprimands. Records indicated that only reprimands had been an effective intervention for Diane's problem behaviors.

Prior to the current study, a reprimand-based treatment had been systematically evaluated and shown to be effective in decreasing Diane's eye-poking (McKenzie, 2002). In addition, the evaluation showed that, after pairing wristbands with a reprimand contingency in the treatment environment, eye-poking decreased in other environments in which the wristbands were worn (living room and canteen). After this evaluation, caregivers were trained to conduct sessions in which wristbands were paired with reprimands (in order to maintain control over eye-poking by the wristbands). In addition, the wristbands were to be placed on Diane at times when it was difficult or impossible to deliver reprimands. For example, when caregivers were unable to attend directly to Diane due to other duties (e.g., providing assistance to other residents), they were instructed to place the wristbands on Diane's wrists. However, staff reports and records indicated that, 8 months following the initial evaluation, the wristbands no longer produced decreases in Diane's eye-poking. Based on these results, the current study was initiated.

Setting and Materials

All procedures were conducted in a therapy room. The room was approximately 3.05 m X 3.05 m and contained a table, chair and wooden bench, and was equipped with a one-way observation mirror. During all wristbands conditions, Diane wore a pair of red Wilson wristbands. Sessions typically took place 5 days a week between 12:30pm and 2:00pm, and two sessions were run each day. Each session was 10 min in duration.

Observation Procedures, Response Definitions, and Interobserver Agreement

Data collectors monitored Diane from behind the observation mirror. Data were collected using either laptop or handheld computers with Observe© software. All observations were conducted by trained graduate and undergraduate behavior analysis students.

Two topographies of SIB were recorded: eye-poking and skin-picking. Eye-poking was defined as contact between the finger/thumb and the area on or around the eyeball. Eye-poking was scored using a duration measure. Skin-picking was scored when the middle or index finger and the thumb made contact with and closure around the skin in or around the mouth; or any picking, poking (forceful contact of the fingers to the skin), or scratching (dragging of the end of the fingers across skin) that made contact with the back of the hand or the leg. Skin-picking around the mouth was scored using event recording. All other skin-picking was scored using a duration measure, in which picking was scored from the onset of the response until Diane had not been observed to engage in picking for a 1 s duration. Data from each session were converted to the percentage of intervals in which eye-poking and skin-picking occurred by summing the number of intervals during which the behaviors were scored, dividing the sum by the number of intervals in the session, and multiplying the result by 100. Results were calculated independently for each defined class (eye-poking and skin poking).

Interobserver agreement data (IOA) were collected on 43.39% of sessions. IOA was calculated for each topography by dividing the number of intervals the observers

agreed, by the sum of the number of intervals the observers agreed and the number of intervals they disagreed, and multiplying the result by 100. Mean percent agreement for eye-poking was 94.18% (range = 83.21% - 100%), and mean agreement for skin-picking was 97.51% (range = 89.89% - 100%).

Experimental Procedures

Pre-session procedures. Before each session, Diane was seated on the wooden bench in the therapy room. Diane was then observed until at least one instance of each of the targeted topographies of SIB occurred. This was done to demonstrate that nothing in the environment precluded the behaviors from occurring. For No Wristbands conditions, sessions were initiated immediately following completion of the last response. For Wristbands conditions, the therapist entered the room and placed the wristbands on Diane's wrists. The therapist then exited the room and the session was initiated.

No Wristbands. Diane was seated on a wooden bench in the therapy room with no leisure materials present. The therapist was not present and there were no programmed consequences for engaging in SIB.

Wristbands (No Reprimands). This condition was identical to the No Wristbands condition except that, prior to the initiation of the session, the therapist entered the room and placed the wristbands on Diane's wrists (see pre-session procedures).

Wristbands (Reprimands). This condition was identical to the Wristbands (No Reprimands) condition except that, when a targeted class of SIB was observed, the

therapist entered the room and said in a firm but neutral tone of voice, “Diane, put your hands down.”

Experimental Design. The design was a multiple baseline withdrawal with a nested multi-element design. The withdrawal and multiple baseline designs were used to assess the direct effects of Wristbands (No Reprimands) and Wristbands (Reprimands) on eye-poking and skin-picking, as well as potential response generalization across topographies. The multi-element design was used to evaluate the effects of Wristbands (No Reprimands) and Wristbands (Reprimands) relative to an ongoing No Wristbands baseline condition. The withdrawal design consisted of the sequential implementation of Wristbands (No Reprimands) and Wristbands (Reprimands) conditions. Wristbands (No Reprimands) and Wristbands (Reprimands) were replicated twice for eye-poking, and once for skin-picking. The multiple baseline design was achieved by staggering implementation of those conditions across topographies. Finally, the multi-element design consisted of rapidly alternating between No Wristbands and Wristbands conditions (across No Reprimands or with Reprimands conditions). Each type of condition (No Wristbands and Wristbands) was conducted daily, with the sequence determined by a coin toss.

CHAPTER III

RESULTS

Throughout the study, experimenters evaluated data based on two measures of each behavior: the percentage of intervals during which the behavior occurred and the number of occurrences of the behavior. Experimental decisions were made based on data patterns displayed as percentage of intervals, which provided information as to whether the overall amount of responding changed as a function of reprimands (and/or wristbands). Occurrence data also were important to determine if there was a change in the number of responses as a function of reprimands (and/or wristbands).

Figure 1 (Appendix A) displays the outcomes of Diane's analysis. The top panel of Figure 1 shows the percentage of intervals during which Diane engaged in eye-poking, and the bottom panel shows the percentage of intervals during which Diane engaged in skin-picking. The y-axes represent the percentage of 10 s intervals containing target behaviors and the x-axis represents consecutive sessions. Solid phase-change lines denote implementation or withdrawal of reprimands for that target behavior. Broken lines designate implementation or withdrawal of reprimands for the other targeted behavior, and are included to assist the viewer in evaluating the generalized effects of the reprimands. Sessions during which wristbands were worn are designated by open circles, and sessions during which no wristbands were worn are designated by closed circles. Condition means and ranges for percentage measures are shown in Table 1 (Appendix A).

An initial baseline (sessions 1-16) was conducted to determine representative measures of target behaviors prior to implementing treatment. Wristbands were manipulated in a multi-element fashion during baseline (and throughout the remainder of the experiment) to identify any effects of wearing wristbands on the target behaviors. Results of the baseline showed moderate and variable levels of both eye-poking and skin-picking. Responding was undifferentiated between No Wristbands and Wristbands (No Reprimands) conditions for both target behaviors.

From session 17 through session 28, reprimands were delivered contingent on eye-poking when Diane wore wristbands. This resulted in an immediate decrease in eye-poking during Wristbands sessions to near-zero levels. No change in eye-poking was observed during No Wristbands sessions. Skin-picking occurred at slightly lower levels during this phase; however, no differentiation between Wristbands and No Wristbands conditions was apparent.

The reprimand contingency for eye-poking was withdrawn at session 29 (i.e., baseline conditions were in effect for both target behaviors). The percentage of intervals containing eye-poking during Wristbands sessions initially remained at low levels following this reversal. To illustrate, the mean percentage of intervals containing eye-poking during the first five sessions of the phase was 5.67%, (range = 1.67% - 8.33%), whereas the mean number of responses during the last five sessions of this phase was 36.32% (range = 16.67% - 86.6%). Eye-poking during No Wristbands session continued to occur at moderate levels throughout this block of sessions, with increased variability observed toward the end of the block. Skin-picking continued to

show undifferentiated patterning between Wristbands and No Wristbands conditions. Significant variability, as well as an overall increasing trend in skin-picking, was observed during this block of sessions.

From session 87 through session 120, reprimands were delivered contingent on skin-picking during Wristbands sessions. The percentage of intervals containing skin-picking during Wristbands sessions decreased to low levels (M = 7.84%, range = 3.33% - 15.00%). Percentages of intervals containing skin-picking during No Wristbands sessions continued to occur at moderate levels throughout this block of sessions (M = 37.55%, range = 20.00% - 61.67%). Eye-poking decreased to near-zero levels (M = 0.69% of intervals, range = 0.00% - 86.60%) during Wristbands sessions, but no change in eye-poking was observed during No Wristbands sessions (M = 36.77% of intervals, range = 3.33% - 90.00%).

At session 121, the reprimand contingency for skin-picking was withdrawn (i.e., baseline conditions were in effect for both target behaviors). Percentages of intervals containing skin-picking showed undifferentiated patterning between Wristbands (M = 25.51%, range = 1.67% - 51.67%) and No Wristbands (M = 17.95%, range = 0.00% - 41.67%) conditions. Following this change, no overlap was seen between Wristbands and No Wristbands sessions for eye-poking during the first twelve sessions. Subsqently, significant overlap between conditions was seen for the remainder of this block of sessions. The mean percentages of intervals containing eye-poking during Wristbands sessions was 19.54% (range = 0.00 - 58.33%), and during No Wristbands session the mean was 39.10% (range = 13.33% - 73.33%).

From session 147 through session 164, reprimands were again presented contingent on eye-poking when Diane wore wristbands. This resulted in an immediate decrease in percentages of intervals containing eye-poking during Wristbands sessions (M = 5.00%, range = 0.00% - 8.33%). No change in percentages of intervals containing eye-poking was observed during No Wristbands sessions (M = 43.70%, range = 18.33% - 80.00%). No differentiation between Wristbands (M = 21.67%, range = 0.00% - 53.33%) and No Wristbands (M = 20.93%, range = 0.00% - 48.33%) conditions was apparent, and measures of skin-picking when wristbands were worn were comparable to those observed in the previous block, when baseline contingencies for both behaviors were in place (M = 25.51%, range = 1.67% - 51.67%).

The reprimand contingency for eye-poking was withdrawn at session 165 (i.e., baseline conditions were in effect for both target behaviors). Percentages of intervals containing eye-poking during Wristbands sessions increased to levels comparable to those observed during the initial baseline (M = 21.16%, range = 3.33% - 36.67%). Eye-poking continued to occur at moderate levels throughout this block of sessions (M = 38.33%, range = 8.33% - 70.00%), but showed more variability than during the initial baseline. Skin-picking continued to show undifferentiated patterning between Wristbands (M = 35.41%, range = 1.67% - 56.67%) and No Wristbands (M = 27.05%, range = 0.00% - 65.00%) conditions.

From session 191 through session 202, reprimands were delivered contingent on skin-picking when Diane wore the wristbands. Percentages of intervals during which skin-picking occurred decreased to low levels during Wristbands sessions (M = 5.56%,

range = 0.00% - 11.67%). Skin-picking continued to occur at levels similar to baseline during No Wristbands sessions (M = 27.50%, range = 8.33% - 53.33%). Eye-poking decreased to near-zero levels during Wristbands sessions (M = 0.56%, range = 0.00% - 3.33%). No change in eye-poking was observed during No Wristbands sessions (M = 32.30%, range = 23.33% - 40.00%).

From session 203 through session 212, reprimands were contingent on eye-poking and skin-picking when Diane wore the wristbands. Percentages of intervals in which eye-poking occurred during the Wristbands sessions remained at near-zero levels (M = 0.00%, range = 0.00% - 0.00%). Percentages of intervals containing eye-poking during No Wristbands conditions showed an initial decrease (M = 19.00%, range = 11.67% - 38.33%) but remained within a similar range to baseline levels. Skin-picking remained at low levels when wristbands were worn (M = 3.66%, range = 1.67% - 5.00%). Percentages of intervals containing skin-picking were lower during no wristbands sessions, on average, than baseline levels (M = 13.00%, range = 10.00% - 20.00%).

Figure 2 (Appendix A) displays the number of occurrences of each target behavior. The top panel of Figure 2 shows the results for eye-poking, and the bottom panel shows results for skin-picking. The number of occurrences of target behaviors is plotted along the y-axes and consecutive sessions are plotted along the x-axes. All other symbols and phase change lines are identical to those used in Figure 1. Means and ranges for percentage measures are shown in Table 2 (Appendix A).

Results of the initial baseline condition (sessions 1-16), during which no contingencies were associated with wristbands, showed moderate and variable levels of both eye-poking and skin-picking. Responding was undifferentiated between No Wristbands and Wristbands (No Reprimands) conditions for both target behaviors. When wristbands were worn, the mean frequency of skin-picking was 13.75, and the mean frequency of eye-poking was 9.75. When wristbands were not worn, the mean frequency of skin-picking was 16.38, and the mean frequency of eye-poking was 12.50.

From session 17 through session 28, reprimands were contingent on eye-poking when Diane wore wristbands. This resulted in an immediate decrease in the number of occurrences of eye-poking during Wristbands sessions to low levels (M =1.50, range = 0 - 4). No change in the frequency of eye-poking was observed during No Wristbands sessions (M = 10.50, range = 4 - 20). The number of occurrences of skin-picking decreased slightly during this phase; however, no differentiation between Wristbands (M = 10.33, range = 1 - 25) and No Wristbands conditions (M = 6.50, range = 1 - 15) was apparent.

The reprimand contingency for eye-poking was withdrawn at session 29 (i.e., baseline conditions were in effect for both target behaviors). The number of occurrences of eye-poking during Wristbands sessions initially remained low following this reversal, but subsequently increased to levels comparable to the initial baseline condition. To illustrate, the mean number of responses per session during the first five sessions of the phase was 4.60 (range = 1 - 12), whereas the mean number of responses during the last five sessions of this phase was 11.20 (range = 8 - 16). Eye-

poking during No Wristbands baseline sessions continued to occur at moderate frequencies (M = 14.49, range = 1 - 30) throughout this block of sessions, with increased variability observed toward the end of the block. Skin-picking continued to show undifferentiated patterning between Wristbands (M = 21.59, range = 0 - 47) and No Wristbands conditions (M = 19.07, range = 2 - 48). Significant variability, as well as an overall increasing trend in skin-picking, was observed during this block of sessions.

From session 87 through session 120, reprimands were contingent on skin-picking when Diane wore the wristbands. During Wristbands sessions, the frequency of skin-picking decreased to low levels (M = 4.88, range = 2 - 9). Skin-picking continued to occur at moderate levels during No Wristbands sessions throughout this block (M = 25.35, range = 11 - 53). The number of occurrences of eye-poking decreased to near-zero levels when wristbands were worn (M = 0.412, range = 0 - 16). No change in eye-poking was observed during No Wristbands sessions (M =13.88, range = 1 - 30).

At session 121, the reprimand contingency for skin-picking was withdrawn (i.e., baseline conditions were again in effect for both target behaviors). Skin-picking returned to an undifferentiated patterning between Wristbands (M = 17.08, range = 0 - 34) and No Wristbands conditions (M = 13.46, range = 0 - 37). Mean frequencies of eye-poking during Wristbands sessions (M = 9.52, range 0 - 27) were lower than during No Wristbands sessions (M = 16.31, range 6 - 32).

From session 147 through session 164, reprimands were again contingent on eye-poking when Diane wore wristbands. This resulted in an immediate decrease in the number of occurrences of eye-poking during Wristbands sessions to low levels (M =

2.89, range = 0 - 5). No change in eye-poking was observed during No Wristbands sessions (M = 15.33, range = 5 - 24). No differentiation between Wristbands (M = 13.89, range = 0 - 32) and No Wristbands (M = 13.67, range = 0 - 32) conditions was apparent, and frequencies of skin-picking were comparable to those observed during the previous block (when baseline contingencies for both behaviors were in place [M = 13.46, range = 0 - 37]).

The reprimand contingency for eye-poking was withdrawn at session 165 (i.e., baseline conditions were in effect for both target behaviors). Frequencies of eye-poking were similar to baseline levels during both Wristbands (M = 9.39, range = 2 - 16) and No Wristbands sessions (M = 15.39, range = 5 - 29). Frequencies of skin-picking appeared undifferentiated between Wristbands (M = 23.54, range = 1 – 37) and No Wristbands sessions (M = 18.46, range = 0 - 48).

From session 191 through session 202, reprimands were contingent on skin-picking when Diane wore the wristbands. During Wristbands sessions, skin-picking decreased to low levels (M = 3.33, range = 0 - 6). During No Wristbands sessions, skin-picking continued to occur at levels similar to baseline. Eye-poking decreased to near-zero levels (M = 0.17, range = 0 - 6). No change in eye-poking was observed during No Wristbands sessions (M = 12.83, range = 10 - 17).

At session 203 through session 212, reprimands were contingent on eye-poking and skin-picking when Diane wore the wristbands. Frequencies of eye-poking during the wristbands sessions remained at near-zero levels (M = 0.40, range = 0 - 2). Frequencies of eye-poking during No Wristbands conditions decreased initially but

remained at levels comparable to those observed during baseline. Skin-picking remained at low levels when wristbands were worn (M = 1.80, range = 0 - 3). During no wristbands sessions, the mean frequency of skin-picking was comparable to baseline (M = 8.40, range = 5 - 10).

CHAPTER IV

DISCUSSION

The results of this study support several conclusions. First, the data indicate that Diane's eye-poking and skin-picking were maintained by automatic, rather than social, reinforcement contingencies. Both topographies of SIB persisted during both No Wristbands and the Wristbands (No Reprimands) conditions during the initial baseline (Session 1 – 16), as well as during No Wristbands conditions throughout the experiment. These results suggest that the two topographies were automatically reinforced. These outcomes also indicate that, although Diane had previously experienced reprimands contingent on eye-poking while wearing wristbands, the wristbands did not have a suppressive effect on either eye-poking or skin-picking at the outset of this study.

Second, the results of this study indicate that reprimands were effective in decreasing the topographies of SIB that produced them. No Wristbands and Wristbands (Reprimands) sessions were alternated within a multi-element design to assess the direct effects of reprimands on each topography of SIB. Throughout the experiment, response measures for the targeted topography were lower during Wristbands (Reprimands) sessions than during No Wristbands sessions. In addition, the effects of reprimands were assessed within a modified withdrawal design across topographies and wristbands conditions (i.e., alternating phases were presented during which one or the other topography produced reprimands when wristbands were worn). Results indicate that, when neither topography produced reprimands, response measures during

Wristbands (No Reprimands) conditions generally increased (however, several distinct patterns of responding were observed during Wristbands [No Reprimands] conditions, which will be discussed below).

Third, the results indicate that the effects of reprimands can be appropriately described as punishment. The outcomes showed that, when directly applied to each topography of problem behavior, reprimands decreased both the overall amount (percentage of intervals) of responding but also decreased the number of responses observed per session. If only the overall amount of responding had been affected (i.e., if Diane had continued to emit responses at baseline frequencies), then the results would be consistent with a response interruption account. The finding that Diane emitted fewer responses during Wristbands (Reprimands) conditions strongly suggests that the reprimands functioned to decrease the subsequent likelihood that responses would be emitted, effects which are most consistent with a punishment account.

Fourth, the results of this study indicate that the effects of reprimands showed idiosyncratic patterns of maintenance across no-reprimand conditions. The use of an experimental design in which reprimands were sequentially presented and withdrawn (and, at the end of the experiment, presented simultaneously [sessions 203 – 212]) across topographies permitted inspection of response patterns following changes in contingencies to identify enduing effects of recently experienced conditions.

Results for eye-poking indicate that the direct effects of Wristbands (Reprimands) endured following its initial implementation, but showed less evidence of maintenance following the second implementation. For example, low levels of eye-

poking persisted for 11 sessions following the first implementation of the reprimand contingency, and response measures remained largely differentiated between Wristbands (No Reprimands) and No Wristbands conditions even after responding in the Wristbands (No Reprimands) condition began to recover. However, responding almost immediately increased following the second implementation of Wristbands (Reprimands). Again, however, differentiation between the data from Wristbands (No Reprimands) and No Wristbands sessions was observed throughout this condition (these effects are most evident in percentages of intervals containing eye-poking, but are also apparent—to a lesser degree—in the frequency data).

Results for skin-picking indicated that the direct effects of Wristbands (Reprimands) did not persist following treatment. That is, when the initial implementation of Wristbands (Reprimands) was terminated (session 121), measures of skin-picking immediately increased, and no differentiation in measures between Wristbands (Reprimands) and No Wristbands sessions was seen. Unfortunately, the second implementation of Wristbands (Reprimands) occurred at the end of the experiment and, thus, it was not possible to replicate these effects; therefore, the strength of this finding is limited.

A fifth general finding of this study was that idiosyncratic patterns of generalization were observed across the two targeted topographies of SIB. By systematically arranging the reprimand contingency for one, the other, or both targeted topographies of SIB, it was possible to evaluate the extent to which the effects of

wristbands with reprimands contingent on the occurrence of one topography affected the other topography.

Results indicate that when wristbands were worn and reprimands were contingent on eye-poking, skin-picking did not show significant or lasting decreases. Patterns of skin-picking remained clearly undifferentiated between Wristbands (No Reprimands) and No Wristbands conditions during the first implementation of Wristbands (Reprimands) for eye-poking (sessions 17 -28). The second block of sessions when reprimands were contingent on eye-poking (sessions 147 -164) produced a similarly undifferentiated pattern; however, for the first three sessions when the wristbands were worn skin-picking (session 147, 149, 151) remained at lower levels than during the first three No Wristbands sessions (148, 150, 152). For the remainder of the condition, however, measures of skin-picking during Wristbands (No Reprimands) sessions were similar to those obtained during No Wristbands sessions.

Results indicate that, when wristbands were worn and reprimands were contingent on skin-picking, eye-poking decreased as well. Diane's eye-poking decreased to near-zero levels when wristbands were worn, whereas levels of eye-poking remained within baseline ranges during No Wristbands sessions (sessions 87 – 120). These effects were replicated during the second implementation of Wristbands (Reprimands) for skin-picking (sessions 191 - 202).

These findings indicate an interesting and unusual pattern of covariance between eye-poking and skin-picking. When eye-poking was directly suppressed via reprimands, no change was observed in skin-picking, even though common stimuli (wristbands)

were programmed. However, when skin-picking was directly suppressed via reprimands, a corresponding decrease in eye-poking was observed. Thus, an asymmetrical pattern of covariance was observed during this study.

It is common for decreases in non-targeted behaviors to accompany decreases in a targeted behavior (Friman & Hove, 1987; Greene, Bailey, & Barber, 1981); however, the current results call to question why the results occurred when one topography was targeted, but not when the other topography was targeted. There are at least three possible explanations as to why asymmetrical covariance occurred in the current study.

First, although both topographies of SIB persisted in No Wristbands conditions, the topographies did not appear to produce the same type of sensory stimulation. Thus, although both topographies appear to be automatically maintained, the specific type or form of stimulation that served as reinforcement for each topography may have been different. Therefore, as potential members of different response classes, different patterns of covariance across the classes might be expected.

Second, the operational definition of skin-picking included responses that occurred at three different sites on the body. Placing the contingency on what, essentially, were three different topographies may have served to obscure the contingency, facilitating generalization across a fourth response (eye-poking). That is, the operative contingency during conditions of Wristbands (Reprimands) for skin-picking may have functioned similarly to a strategy for generalizing outcomes known as using ambiguous, or indiscriminable contingencies (Stokes & Baer, 1977).

Third, Diane had previously experienced a contingency in which reprimands had been contingent on eye-poking when wristbands were worn (McKenzie, 2002). Previous outcomes had shown that, for Diane, the effects of pairing wristbands with reprimands generalized to environments in which wristbands were worn but reprimands were not delivered. Thus, her history showed that the effects of wristbands could persist in the absence of a punishment contingency even when other responses (e.g., skin-picking) did not produce reprimands. It is possible, therefore, that the effects observed in the current study did not represent covariance, or response generalization, but stimulus generalization, in which wearing the wristbands directly reduced eye-poking, independent of the contingency arranged for and/or the effects of that contingency on skin-picking. Differentiation in eye-poking measures between Wristbands (No Reprimands) and No Wristbands sessions that immediately followed the first implementation of reprimands for eye-poking is consistent with this account. However, this account does not explain why this generalized effect waned after several sessions, why little evidence of generalization was observed following the second implementation of Wristbands (Reprimands) for eye-poking, or why a similar pattern of generalization was not seen for skin-picking (i.e. it is not clear why measures of skin-picking did not remain low during Wristbands [No Reprimands] sessions that followed Wristbands [Reprimands] conditions). Therefore, although Diane's history may have been partially responsible for the patterns of generalization observed during this study, history alone does not seem to account for several aspects of the data.

A reason why the effects of Wristbands (Reprimands) for skin-picking did not persist during subsequent No Reprimands conditions could be related to a sequence effect. Eye-poking was exposed to the treatment contingency before skin-picking, and treatment was withdrawn for eye-poking prior to its first implementation for skin-picking. Therefore, when treatment was implemented and withdrawn for skin-picking, Diane had already experienced the sequence of Wristbands (Reprimands) and then Wristbands (No Reprimands) for eye-poking. Following this rationale, the discriminative control by the wristbands may have already been weakened by the time the treatment was withdrawn for skin-picking.

Several limitations of the current study should be mentioned. First, the study was performed with a single participant, who had a previous history with a similar intervention. It is unclear whether or to what extent this history affected the outcomes. Thus, these procedures should be replicated with additional, naïve, participants to determine the generality of these outcomes. Second, although both behaviors appeared to be automatically maintained, no formal functional analysis was conducted immediately prior to this study, and we were not able to determine if the two topographies were members of the same response class. However, the initial baseline and ongoing No Wristbands conditions provided evidence that the both topographies reliably occurred in the absence of social consequences, strongly indicating automatic maintenance of these behaviors.

Further research in this area could compare the effects of variable (e.g., variable ratio [VR] or variable interval [VI]) schedule of consequences rather than a continuous, or FR 1, schedule. If the schedule of consequences was less predictable, more time may be required to establish stimulus control, but such control may persist for longer period after the reprimand schedule is withdrawn. Another interesting research direction might be to look at immediate generalization effects. For example, a mixed schedule could be used to evaluate the number of minutes required for recovery to occur immediately after the contingency was withdrawn (or wristbands were removed) rather than evaluating effects across sessions. If effects were observed to persist for long durations, then mediated generalization procedures could be used immediately prior to times during which it is difficult or impossible to implement treatment contingencies. Another potentially interesting direction for future research is the analysis of the effects of various parametric values of treatment. For example, different durations of exposure to contingencies and correlated stimuli could affect the course and duration of generalization effects. Such effects would be of interest to both clinicians and researchers. Finally, the effects of such procedures within and across functional classes might be investigated by conducting comprehensive functional analyses (i.e. separate analyses for all targeted topographies) prior to treatment. This could be accomplished by selecting and systematically applying contingencies and correlated stimuli to topographies that had been shown to be maintained by different and similar contingencies.

Numerous studies have shown punishment procedures to be useful to treat severe behavior problems. However, Lerman and Vorndran (2002, p. 27) suggest that a "further understanding of punishment is needed to develop a systematic, effective technology of behavior change." They further suggest that most studies investigating punishment effects "focused on procedural variations of punishment rather than on factors that may influence the direct and indirect effects of punishment." (p. 27). The current procedures demonstrated both direct effect and indirect effects of a punisher (reprimands) for automatically reinforced SIB. Direct effects were apparent when reprimands were successful in decreasing the topographies of SIB that produced them. Indirect effects were also apparent, (i.e. when skin-picking was directly suppressed via reprimands, a corresponding decrease in eye-poking was observed); however, the indirect effects shown in this study were idiosyncratic (as described above), and more research is needed to clearly identify factors that may influence these effects.

APPENDIX

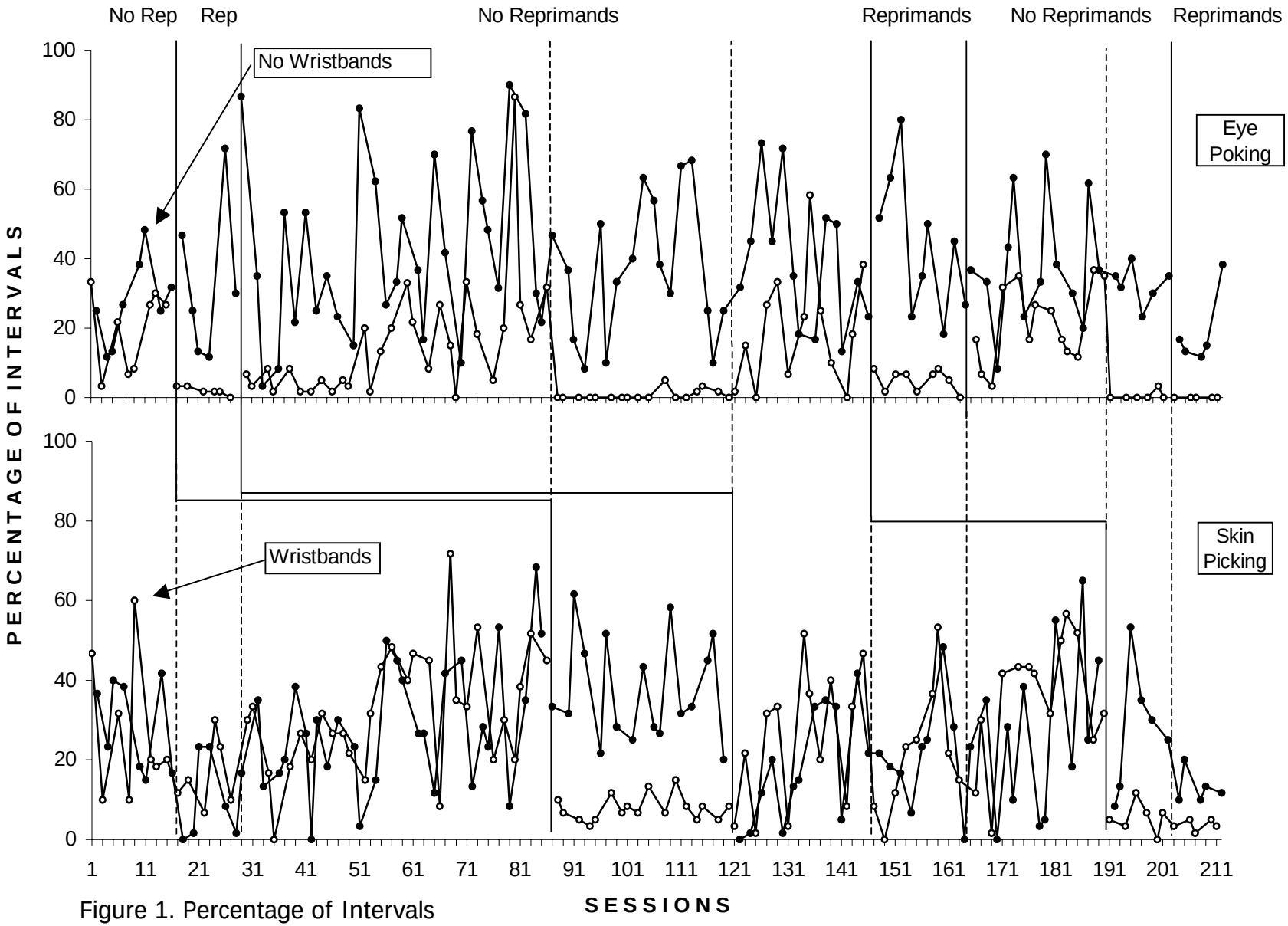

Figure 1. Percentage of Intervals

Table 1	No Reprimand	Reprimand	No Reprimand	Reprimand	No Reprimand	Reprimand	No Reprimand	Reprimand	Reprimand
Mean Percent of Intervals of Eye Poking and Skin Picking									
Sessions	1-16	17-28	29-86	87-120	121-146	147-164	165-190	191-202	203-212
Skin Picking									
With Wristbands	27.08	16.11	32.01	7.84	25.51	21.67	35.41	5.56	3.67
Without Wristbands	28.75	9.72	29.48	37.55	17.95	20.93	27.05	27.50	13.00
Eye Poking									
With Wristbands	19.58	1.95	15.33	0.69	19.74	5.00	21.16	0.56	0.00
Without Wristbands	27.50	33.06	42.38	36.77	39.10	43.70	38.33	32.50	19.00
Range of Percent of Intervals of Eye Poking and Skin Picking									
Skin Picking									
With Wristbands	10.00 - 60.00	6.67 - 30.00	0.00 - 71.67	3.33 - 15.00	1.67 - 51.67	0.00 - 53.33	1.67 - 56.67	0.00 - 11.67	1.67 - 5.00
Without Wristbands	15.00 - 41.67	0.00 - 23.33	3.33 - 68.33	20.00 - 61.67	0.00 - 41.67	0.00 - 48.33	0.00 - 65.00	8.33 - 53.33	10.00 - 20.00
Eye Poking									
With Wristbands	3.33 - 33.33	0.00 - 3.33	0.00 - 86.60	0.00 - 86.60	0.00 - 58.33	0.00 - 8.33	3.33 - 36.67	0.00 - 3.33	0.00 - 0.00
Without Wristbands	11.67 - 48.33	11.67 - 71.66	3.33 - 90.00	3.33 - 90.00	13.33 - 73.33	18.33 - 80.00	8.33 - 70.00	23.33 - 40.00	11.67 - 38.33

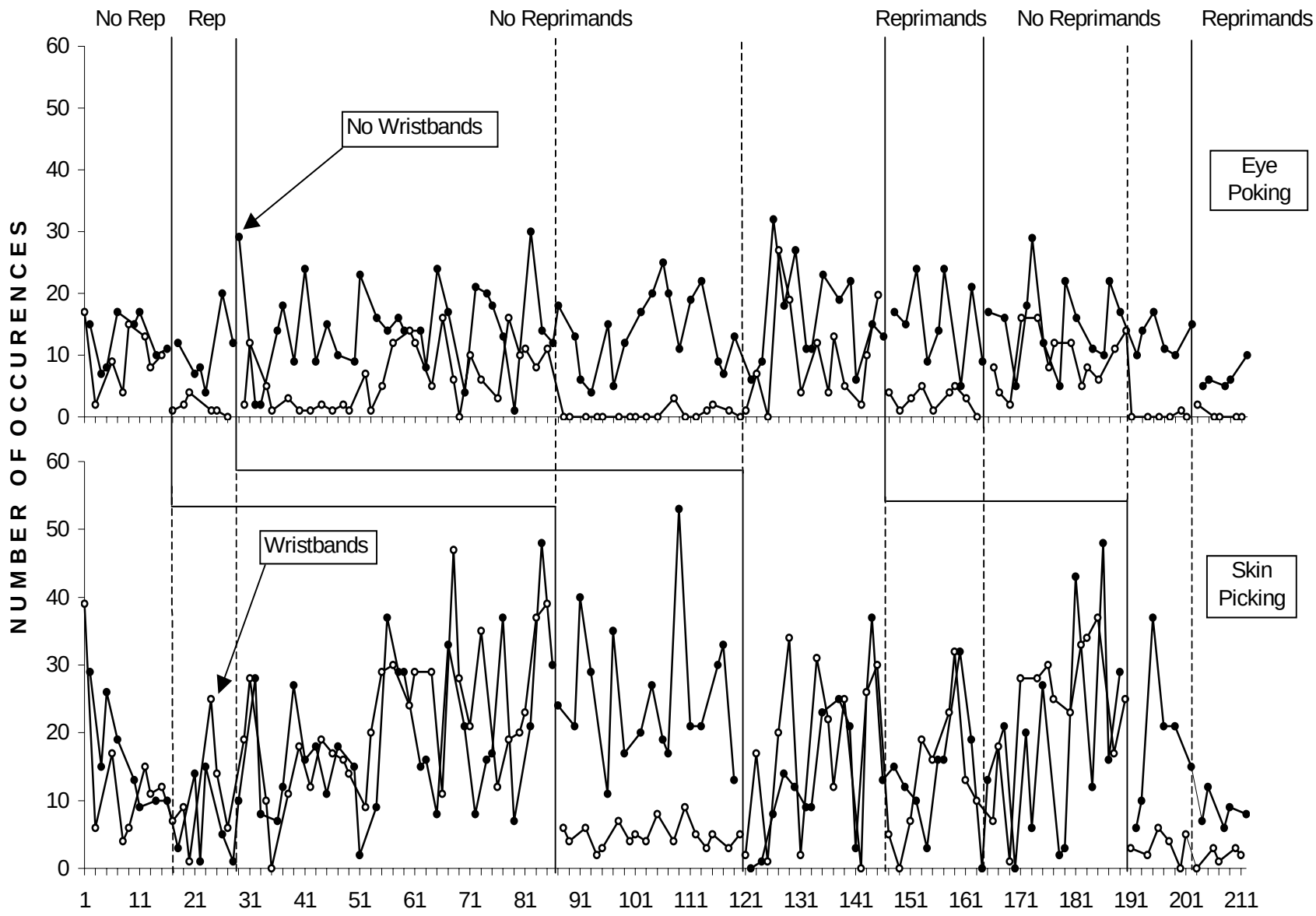

Figure 2. Number of Occurrences

Table 2	No Reprimand	Reprimand	No Reprimand	Reprimand	No Reprimand	Reprimand	No Reprimand	Reprimand	Reprimand
Mean Attempts of Eye Poking and Skin Picking									
Sessions	1-16	17-28	29-86	87-120	121-146	147-164	165-190	191-202	203-212
Skin Picking									
With Wristbands	13.75	10.33	21.59	4.88	17.08	13.89	23.54	3.33	1.80
Without Wristbands	16.38	6.50	19.07	25.35	13.46	13.67	18.46	18.33	8.40
Eye Poking									
With Wristbands	9.75	1.50	6.34	0.41	9.52	2.89	9.38	0.17	0.40
Without Wristbands	12.50	10.50	14.49	13.88	16.31	15.33	15.38	12.83	6.40
Range of Attempts of Eye Poking and Skin Picking									
Skin Picking									
With Wristbands	4 - 39	1 - 25	0 - 47	2 - 9	0 - 34	0 - 32	1 - 37	0 - 6	0 - 3
Without Wristbands	9 - 29	1 - 15	2 - 48	11 - 53	0 - 37	0 - 32	0 - 48	6 - 37	6 - 12
Eye Poking									
With Wristbands	2 - 17	0 - 4	0 - 16	0 - 16	0 - 27	0 - 5	2 - 16	0 - 1	0 - 2
Without Wristbands	7 - 17	4 - 20	1 - 30	1 - 30	6 - 32	5 - 24	5 - 29	10 - 17	5 - 10

REFERENCES

Buffington, D. M., Krantz, P. J., McClannahan, L. E., & Poulson, C. L. (1998). Procedures for teaching appropriate gestural communication skills to children with autism. *Journal of Autism and Developmental Disorders, 28,* 535-545.

Carey R. G., & Bucher, B. (1983). Positive practice overcorrection: The effects of duration of positive practice on acquisition and response reduction. *Journal of Applied Behavior Analysis, 16,* 101-109.

Catania, A. C. (1998). *Learning (4th ed.)*. Upper Saddle River, NJ: Prentice Hall.

Corte, H., Wolf, M., & Locke, B. (1971). A comparison of procedures for eliminating self-injurious behavior of retarded adolescents. *Journal of Applied Behavior Analysis, 4,* 201-213.

Cowdery, G. E., Iwata, B. A., & Pace, G. M. (1990). Effects and side effects of DRO as treatment for self-injurious behavior. *Journal of Applied Behavior Analysis, 23,* 497-506.

Cuvo, A. J., Leaf, R. B., & Borakove, L. S. (1978). Teaching janitorial skills to the mentally retarded: acquisition, generalization, and maintenance. *Journal of Applied Behavior Analysis, 11*, 3, 345-355.

DeLeon, I. G., Anders, B. M., Rodriguez-Catter, V., & Neidert, P. L. (2000). The effects of noncontingent access to single—versus multiple-stimulus sets on self-injurious behavior. *Journal of Applied Behavior Analysis, 33,* 623-626.

Dorsey, M. F., Iwata, B. A., Ong, P., & McSween, T. E. (1980). Treatment of self-injurious behavior using a water mist: Initial response suppression and generalization. (1980). *Journal of Applied Behavior Analysis, 13,* 343-353.

Dorsey, M. F., Iwata, B. A., Reid, D. H., & Davis, P. A. (1982). Protective equipment: Continuous and contingent application in treatment of self-injurious behavior. *Journal of Applied Behavior Analysis, 15,* 217-230.

Flanagan, B., Goldiamond I., & Azrin, N. (1958). Operant stuttering: The control of stuttering behavior through response-contingent consequences. *Journal of Experimental Analysis of Behavior, 1,* 173-177.

Foxx, R. M., & Azrin, N. H. (1973). The elimination of autistic self-stimulatory behavior by overcorrection. *Journal of Applied Behavior Analysis, 6,* 1-14.

Friman, P. C., & Hove, G. (1987). Apparent covariation between child habit disorders: Effects of successful treatment for thumb sucking on untargeted chronic hair pulling. *Journal of Applied Behavior Analysis, 20,* 421-425.

Greene, B. F., Bailey, J. S., & Barber, F. (1981). An analysis and reduction of disruptive behavior on school buses. *Journal of Applied Behavior Analysis, 14,* 177-192.

Halle, J. W., & Holt, B. (1991). Assessing stimulus control in natural settings: An analysis of stimuli that acquire control during training. *Journal of Applied Behavior Analysis, 24,* 579-589.

Haring, T. G. (1985) Teaching between-class generalization of toy play behavior to handicapped children. *Journal of Applied Behavior Analysis, 18,* 127-139.

Horner, R. D. (1980). The effects of environmental “enrichment” program on the behavior of institutionalized profoundly retarded children. *Journal of Applied Behavior Analysis, 13,* 474-491.

Hyman, S. L., Fisher, W., Mercugliano, M., & Cataldo, M. F. (1990). Children with self-injurious behavior. *Pediatrics, 85, 3*, 437-441.

Iwata, B. A., Dorsey, Slifer, K. J., Bauman, K. E., & Richman, G. S. (1982/1994). Toward a functional analysis of self-injury. *Journal of Applied Behavior Analysis, 27,* 197-209. (Reprinted from *Analysis and Intervention in Developmental Disabilities, 2,* 1-20, 1982).

Keller, F. S., & Schoenfeld, W. N. (1950). *Principles of psychology; A systematic text in the science of behavior*. East Norwalk, CT: Appleton-Century-Crofts.

Kirby, K. C., & Holborn, S. W. (1986). Trained, generalized, and collateral behavior changes of preschool children receiving gross-motor skills training. *Journal of Applied Behavior Analysis, 19*, 283-288.

Koegel, R. L., & Covert, A. (1972). The relationship of self-stimulation to learning in autistic children*. Journal of Applied Behavior Analysis, 5,* 381-387.

Lerman, D. C., & Iwata, B. A. (1996). A methodology for distinguishing between extinction and punishment effects associated with response blocking. *Journal of Applied Behavior Analysis, 29,* 231-234.

Lerman, D. C., & Vorndran, C. M. (2002). On the status of knowledge for using punishment: Implications for treating behavior disorders. *Journal of Applied Behavior Analysis, 35,* 431-464.

Lindberg, J. S., Iwata, B. A., & Kahng, S. (1999). On the relation between object manipulation and stereotypic self-injurious behavior. *Journal of Applied Behavior Analysis, 32,* 51-62.

Linscheid, T. R., Iwata, B. A., Ricketts, R. W., Williams, D. E., & Griffin, J. C. (1990). Clinical evaluation of SIBIS: The self-injurious behavior inhibiting system. *Journal of Applied Behavior Analysis, 23,* 53-78.

Lovass, O. I., Koegel, R. L., & Schreibman, L. (1979). Stimulus overselectivity in autism: a review of research. *Psychological Bulletin, 86,* 1236-1254.

Lovass, O. I., Schreibman, L., Koegel, R., & Rehm, R. (1971). Selective responding by autistic children to multiple sensory input. *Journal of Abnormal Psychology, 77*, 211-222.

Ludwig, T. D., & Geller, E. S. (1991). Improving the driving practices of pizza deliverers: Response generalization and moderating effects of driving history. *Journal of Applied Behavior Analysis, 24,* 31-44.

Mace, F. C., & Belfiore, P. (1990). Behavioral Momentum in the Treatment of Escape-Motivated Stereotypy. *Journal of Applied Behavior Analysis, 23,* 507-514.

Magee, S. K., & Ellis, J. (2000). Extinction effects during the assessment of multiple problem behaviors. *Journal of Applied Behavior Analysis, 33,* 313-316.

Maglieri, K. A., DeLeon, I. G., Rodrigez-Catter, V., & Sevin, B. M. (2000). Treatment of covert food stealing in an individual with Prader-Willi syndrome. *Journal of Applied Behavior Analysis, 33,* 615-618.

Marchand-Martella, N. E., Martella, R. C., Agran, M., Salzberg, C. L., Young, K. R., & Morgan, D. P. (1992). Generalized effects of a peer-delivered first aid program for students with moderate intellectual disabilities. *Journal of Applied Behavior Analysis, 25,* 841-851.

McCord, B. E., Thomson, R. J., & Iwata , B. A. (2001). Functional analysis and treatment of self-injury associated with transitions. *Journal of Applied Behavior Analysis, 34,* 195-210.

McKenzie, S. D. (2002). Suppressive effects of a stimulus correlated with reprimands for automatically-maintained eye poking. Unpublished masters thesis, University of North Texas.

Michael, J. (1993). Establishing operations. *The Behavior Analyst, 16,* 191-206.

Piazza, C. C., Adelinis, J. D., Hanley, G. P., Goh, H. L., & Delia, M. D. (2000). An evaluation of the effects of matched stimuli on behaviors maintained by automatic reinforcement. *Journal of Applied Behavior Analysis, 33,* 13-27.

Piazza, C. C., Hanley, G. P., & Fisher, W. W. (1996). Functional analysis and treatment of cigarette pica. *Journal of Applied Behavior Analysis, 29*, 437-450.

Rasing, E. J. (1993). Effects of multifaceted training on the social behavior of hearing-impaired children with severe language disabilities: A replication. *Journal of Applied Behavior Analysis, 26,* 405-406.

Reid, D. H., Parsons, M. B., Phillips, J. F., & Green, C. W. (1993). Reductions of self-injurious hand mouthing using response blocking. *Journal of Applied Behavior Analysis, 26*, 139-140.

Rekers, G. A., & Lovass, O. I. (1974). Behavioral treatment of deviant sex-role behaviors in a male child. *Journal of Applied Behavior Analysis, 7,* 173-190.

Rincover, A.,& Koegel, R. L. (1975). Setting generality and stimulus control in autistic children. *Jounral of Applied Behavior Analysis, 8,* 235-246.

Risley, T. R. (1968). The effects and side effects of punishing the autistic behaviors of a deviant child. *Journal of Applied Behavior Analysis, 1,* 21-34.

Sajwaj, T., Libet, J., & Agras, S. (1974). Lemon-juice therapy: The control of life-threatening rumination in a six-month-old infant. *Journal of Applied Behavior Analysis, 7,* 557-563.

Shulka, S., & Albin, R. W. (1996). Effects of extinction alone and extinction plus functional communication training on covariation of problem behaviors. *Journal of Applied Behavior Analysis, 29,* 565-568.

Singh, N. N. (1981). Current trends in the treatment of self-injurious behavior. *Advances in Pediatrics*, 28, 377-440.

Singh, N. N., & Millichamp, C. J. (1987). Independent and social play among profoundly mentally retarded adults: Training, maintenance, generalization, and long-term follow-up. *Journal of Applied Behavior Analysis, 20,* 23-24.

Smith, R. G., Russo, L., & Le, D. D. (1999). Distinguishing between extinction and punishment effects of response blocking: A replication. *The Journal of Applied Behavior Analysis, 32*, 367-370.

Sprague, J. R., & Horner, R. H. (1992). Covariation within functional response classes: Implications for treatment of severe problem behavior. *Journal of Applied Behavior Analysis, 25,* 735-745.

Stokes, T. F., & Baer, D. M. (1977). An implicit technology of generalization. *Journal of Applied Behavior Analysis, 10,* 349-367.

Van Houten, R., Nau, P. A., Mackenzie-Keating, S., Sameoto, D., & Colavecchia, E. (1982). An analysis of some variables influencing the effectiveness of reprimands. *Journal of Applied Behavior Analysis, 15,* 65-83.

Vaughn, M. E., & Michael, J. L., (1982). Automatic reinforcement: An important but ignored concept*. Behaviorism, 10,* 217-228.

Voeltz, L. M., & Evans, I. M. (1982). The assessment of behavioral interrelationships in child behavior therapy. *Behavioral Assessment, 4,* 131-165.

Vollmer, T. R. (1994). The concept of automatic reinforcement: Implications for behavioral research in developmental disabilities. *Research in Developmental Disabilities, 15,* 187-207.

Vollmer, T. R., Marcus, B. A., & LaBlanc, L. (1994). Treatment of self-injury and hand mouthing following inconclusive functional analyses. *Journal of Applied Behavior Analysis, 27,* 331-344.

Wacker, D. P., Steege, M. W., Northup, J., Sasso, G., Berg, W., Reimers, T. Cooper, L., Cigrand, K., & Donn, L. (1990). A component analysis of functional communication training across three topographies of severe behavior problems. *Journal of Applied Behavior Analysis, 23,* 417-429.

Watson, T. S., Dittmer, K., I. & Ray, K. P. (2000). Treating trichotillomania in a toddler: Variations on effective treatments. *Child and Family Behavior Therapy, 22,* 29-40.

Young, J. M., Krantz, P. J., McClannahan, L. E., & Poulson, C. L. (1994). Generalized imitation and response-class formation in children with autism. *Journal of Applied Behavior Analysis, 27,* 685-697.